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CULLEN, SEAN P	
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NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/581,859	KAJIWARA, SHIGETO	
	Examiner	**Art Unit**	
	Sean P. Cullen, Ph.D.	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _08 March 2011_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _15-23 and 25-32_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _15-23 and 25-32_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. **Claims 1-14 and 24** are canceled.

2. **Claims 15-23 and 25-32** are pending.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. **Claims 15-18, 23, 25, 26 and 31** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hunt et al. (U.S. 2004/0083039 A1) in view of Nonobe et al. (U.S. 5,929,594 A).

Regarding **claim 15**, Hunt et al. discloses a hybrid fuel cell system (Figs. 1 and 2) comprising:

- a fuel cell (12, Fig. 1; 41, Fig. 2);
- an electric power storage device (32, Figs. 1 and 2);
- a load portion (see primary loads, [0022]; 44, Fig. 2) which consumes electric power (see supplies current, [0022]); and
- a control portion (37) that is programmed to:
    - compute a supply electric power set value (I REQ, Fig. 2) indicating an amount of electric power that needs to be supplied from the electric power storage device (32, [0039]);
    - measure an actual supply electric power value (I HVEC, Fig. 2) indicating

an amount of electric power that is actually supplied from the electric power storage device (32, [0047]);

  - determine whether the supply electric power set value (I REQ, Fig. 2) is greater than or less than the actual supply electric power value (I HVEC, [0047]); and
  - change an amount of electric power (see voltage command, [0047]) after the control portion (37) determines that the supply electric power set value (I REQ, Fig. 2) is greater than or less than the actual supply electric power value (I HVEC, Fig. 2);

- wherein the control portion (37) is programmed to remove imbalance between charge and discharge (see equilibrium, [0047]) of the electric power storage device (32) in the system (Figs. 1 and 2) by reducing a difference between the supply electric power set value (I REQ, Fig. 2) and the actual supply electric power value (I HVEC, Fig. 2).

Hunt et al. does not explicitly disclose:

- a supply electric power set value, which is an amount of electric power that needs to be supplied from the electric power storage device

Hunt et al. discloses a supply electric power set value that is an amount of current that needs to be supplied from the electric power storage device. The power supplied and current supplied are related by Joule's law, which states the power of a circuit is equal to the product of the current and voltage (i.e., P = I x V). The power supplied is proportional to the current supplied. Therefore, it would have been obvious to one of ordinary skill in the art at the time of

the invention to make the control portion of Hunt et al. using a power set value instead of a current set value because it amounts to the using a known law to transform a first variable to a second variable by a known law.

Modified Hunt et al. does not explicitly disclose:

- a control portion that is programmed to change an amount of electric power consumed by the load portion to increase or decrease consumption
- wherein the control portion is programmed to change the amount of electric power consumed by the load portion to increase or decrease consumption

Nonobe et al. discloses a hybrid fuel cell system (10) comprising a control portion (50) that is programmed to change an amount of electric power consumed by the load portion (32 and 34, C11/L56-C12/L7) to increase or decrease consumption (C14/L50-67) and wherein the control portion (50) is programmed to change the amount of electric power consumed by the load portion (32 and 34, C11/L56-C12/L7) to increase or decrease consumption (C14/L50-67) in order to prevent the remaining charge of a battery from decreasing to a critical level and protect fuel cells from excess loading (C2/L18-24). Nonobe et al. further discloses that the restriction of the motor is dependent on the charging/discharging state of the battery (S140, Fig. 6, C12/L15-C13/L16) and that the remaining charge of a storage battery should not decrease below a critical level in order to ensure a sufficient supply of electric power (C2/L17-24). Hunt et al. discloses that the HVEC error can determine the charging/discharging state of the battery (32, [0048]). Hunt et al. and Nonobe et al. are analogous art because they are directed to hybrid fuel cell systems. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was to make the hybrid fuel cell system of Hunt et al. and include a control portion

as taught by Nonobe et al. in order to prevent the remaining charge of a battery from decreasing to a critical level to protect the battery and ensure a sufficient supply of electric power is available from the battery.

Regarding claim 16, modified Hunt et al. discloses all claim limitations set forth above and further discloses a hybrid fuel cell system:

- wherein the control portion (37) is programmed to obtain the supply electric power set value (I REQ, Fig. 2) based on
  - at least a second supply electric power set value (I FC REQ, Fig. 2) indicating an amount of electric power that needs to be supplied from the fuel cell (41, [0029]) and
  - a consumption electric power set value (I LOAD, [0056]) indicating an amount of electric power that needs to be consumed by the load portion (44, [0056]).

Regarding claim 17, modified Hunt et al. discloses all claim limitations set forth above and further discloses a hybrid fuel cell system:

- wherein the load portion (44) includes a system accessory (14, 19, 23, 24, 26, 28, 30 and 36, Fig. 1), and
- the control portion (37) is programmed to obtain the supply electric power set value (I REQ, Fig. 2),
  - using the consumption electric power set value (I LOAD, [0056]) including an amount of electric power consumed by the system accessory (44, [0056]).

Regarding claim 18, modified Hunt et al. discloses all claim limitations set forth above and further discloses a hybrid fuel cell system:

- wherein the load portion (44, Fig. 2) includes a drive motor (14, Fig. 1), and
- the control portion (37) is programmed to control an amount of electric power (see voltage command, [0047]) based on the difference between the supply electric power set value (I REQ, Fig. 2) and the actual supply electric power value (I HVEC, Fig. 2).

Hunt et al. does not explicitly disclose:

- wherein the control portion is programmed to control an amount of electric power consumed by the drive motor;

Nonobe et al. discloses wherein a control portion (50) is programmed to control an amount of electric power consumed by the drive motor (32, C11/56-C12/L7) in order to prevent the remaining charge of a battery from decreasing to a critical level and protect fuel cells from excess loading (C2/L18-24). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was to make the hybrid fuel cell system of modified Hunt et al. with the control portion of Nonobe et al. in order to prevent the remaining charge of a battery from decreasing to a critical level and protect fuel cells from excess loading.

Regarding claim 23, Hunt et al. discloses a hybrid fuel cell system (Figs. 1 and 2) comprising:

- a fuel cell (12, Fig. 1; 41, Fig. 2);
- an electric power storage device (32, Figs. 1 and 2);
- a load portion (see primary loads, [0022]; 44, Fig. 2) which consumes electric

power (see supplies current, [0022]);

- a first control portion (37) that is programmed to:
    - compute a supply electric power set value (I REQ, Fig. 2) indicating an amount of electric power that needs to be supplied from the electric power storage device (32, [0039]),
    - based on a second supply electric power set value (I FC REQ, Fig. 2) indicating an amount of electric power that needs to be supplied from the fuel cell (41, [0029]) and a consumption electric power set value (I LOAD, [0056]) indicating an amount of electric power that needs to be consumed by the load portion (44, [0056]); and
    - measure an actual supply electric power value (I HVEC, Fig. 2) indicating an amount of electric power that is actually supplied from the electric power storage device (32, [0047]);
- a difference obtaining portion (70) that is programmed to determine whether the supply electric power set value (I REQ, Fig. 2) is greater than or less than the actual supply electric power value (I HVEC, Fig. 2);
- a second control portion (40) that is programmed to control the amount of electric power (see voltage command, [0047]) based on a difference (HVEC ERROR, Fig. 2) between the supply electric power set value (I REQ, Fig. 2) and the actual supply electric power value (I HVEC, Fig. 2); and
- a computing portion (46) that is programmed to change the amount of electric power (see voltage command, [0047]) after the difference obtaining portion (70)

determines that the supply electric power set value (I REQ, Fig. 2) is greater than or less than the actual supply electric power value (I HVEC, Fig. 2) to remove imbalance between charge and discharge (see equilibrium, [0047]) of the electric power storage device (32) in the system (Figs. 1 and 2) by reducing the difference (HVEC ERROR, Fig. 2) between the supply electric power set value (I REQ, Fig. 2) and the actual supply electric power value (I HVEC, Fig. 2).

Hunt et al. does not explicitly disclose:

- a supply electric power set value, which is an amount of electric power that needs to be supplied from the electric power storage device

Hunt et al. does not explicitly discloses that the supply electric power set value is an amount of electric power that needs to be supplied from the electric power storage device, but a supply electric power set value that is an amount of current that needs to be supplied from the electric power storage device. The power supplied and current supplied are related by Joule's law, which states the power of a circuit is equal to the product of the current and voltage (i.e., P = I x V). The power supplied is proportional to the current supplied. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the control portion of Hunt et al. using a power set value instead of a current set value because it amounts to the using a known law to transform a first variable to a second variable by a known law.

Modified Hunt et al. does not explicitly disclose:

- a second control portion that is programmed to control the amount of electric power consumed by the load portion;
- a computing portion that is programmed to change the amount of electric power

consumed by the load portion to increase or decrease consumption;

Nonobe et al. discloses a second control portion (50) that is programmed to control the amount of electric power consumed by the load portion (32 and 34, C11/L56-C12/L7) and a computing portion (50) that is programmed to change the amount of electric power consumed by the load portion to increase or decrease consumption (C14/L50-67) in order to prevent the remaining charge of a battery from decreasing to a critical level and protect fuel cells from excess loading (C2/L18-24). Nonobe et al. further discloses that the restriction of the motor is dependent on the charging/discharging state of the battery (S140, Fig. 6, C12/L15-C13/L16) and that the remaining charge of a storage battery should not decrease below a critical level in order to ensure a sufficient supply of electric power (C2/L17-24). Hunt et al. discloses that the HVEC error can determine the charging/discharging state of the battery (32, [0048]). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was to make the hybrid fuel cell system of Hunt et al. and include a control portion as taught by Nonobe et al. in order to prevent the remaining charge of a battery from decreasing to a critical level to protect the battery and ensure a sufficient supply of electric power is available from the battery.

Regarding claim 25, modified Hunt et al. discloses all claim limitations set forth above and further discloses a hybrid fuel cell system:

- wherein the load portion (44) includes a system accessory (14, 19, 23, 24, 26, 28, 30 and 36, Fig. 1), and
- the first control portion (37) is programmed to obtain the supply electric power set value (I REQ, Fig. 2),
    - using the consumption electric power set value (I LOAD, [0056])

including an amount of electric power consumed by the system accessory (44, [0056])

Regarding claim 26, modified Hunt et al. discloses all claim limitations set forth above and further discloses a hybrid fuel cell system:

- wherein the load portion (44, Fig. 2) includes a drive motor (14, Fig. 1), and
- the second control portion (40, Fig. 2) is programmed to control an amount of electric power (see voltage command, [0047]) based on the difference between the supply electric power set value (I REQ, Fig. 2) and the actual supply electric power value (I HVEC, Fig. 2).

Hunt et al. does not explicitly disclose:

- wherein the control portion is programmed to control an amount of electric power consumed by the drive motor;

Nonobe et al. discloses wherein a control portion (50) is programmed to control an amount of electric power consumed by the drive motor (32, C11/56-C12/L7) in order to prevent the remaining charge of a battery from decreasing to a critical level and protect fuel cells from excess loading (C2/L18-24). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was to make the hybrid fuel cell system of modified Hunt et al. with the control portion of Nonobe et al. in order to prevent the remaining charge of a battery from decreasing to a critical level and protect fuel cells from excess loading.

Regarding claim 31, claim elements "first control means for obtaining…", "difference obtaining means for obtaining a difference", "second control means for controlling…," and "computing means for changing", are means (or step) plus function limitations that invoke 35

U.S.C.112, sixth paragraph. In the instant specification, “first control means for obtaining…” is positively recited as element (11), “difference obtaining means for obtaining a difference” is positively recited as element (41), “second control means for controlling…” is positively recited as element (12), and “computing means for changing” is positively recited as element (17, [0047]).

Regarding claim 31, Hunt et al. discloses a hybrid fuel cell system (Figs. 1 and 2) comprising:

- a fuel cell (12, Fig. 1; 41, Fig. 2);
- an electric power storage device (32, Figs. 1 and 2);
- a load portion (see primary loads, [0022]; 44, Fig. 2) which consumes electric power (see supplies current, [0022]);
- the load portion (44, Fig. 2) including a system accessory device (19, 23, 24, 26, 28, 30 and 36, Fig. 1) other than a main drive motor (14, Fig. 1);
- first control means (37) for;
    - obtaining a supply electric power set value (I REQ, Fig. 2) indicating an amount of electric power that needs to be supplied from the electric power storage device (32, [0039]),
    - based on a second supply electric power set value (I FC REQ, Fig. 2) indicating an amount of electric power that needs to be supplied from the fuel cell (41, [0029]) and a consumption electric power set value (I LOAD, [0056]) indicating an amount of electric power that needs to be consumed by the load portion (44, [0056]); and

  - measuring an actual supply electric power value (I HVEC, Fig. 2) indicating an amount of electric power that is actually supplied from the electric power storage device (32, [0047]);

- difference obtaining means (70) for determining whether the supply electric power set value (I REQ, Fig. 2) is greater than or less than the actual supply electric power value (I HVEC, Fig. 2);
- second control means (40) for controlling the amount of electric power (see voltage command, [0047]) based on a difference (HVEC ERROR, Fig. 2) between the supply electric power set value (I REQ, Fig. 2) and the actual supply electric power value (I HVEC, Fig. 2); and
- computing means (46) for changing an amount of electric power consumed by the system accessory device (36) of the load portion (44, Fig. 1) after the difference obtaining means (70) determines that the supply electric power set value (I REQ, Fig. 2) is greater than or less than the actual supply electric power value (I HVEC, Fig. 2) to remove imbalance between charge and discharge (see equilibrium, [0047]) of the electric power storage device (32) in the system (Figs. 1 and 2) by reducing the difference (HVEC ERROR, Fig. 2) between the supply electric power set value (I REQ, Fig. 2) and the actual supply electric power value (I HVEC, Fig. 2).

Hunt et al. does not explicitly disclose:

- a supply electric power set value, which is an amount of electric power that needs to be supplied from the electric power storage device

Hunt et al. does not explicitly discloses that the supply electric power set value is an amount of electric power that needs to be supplied from the electric power storage device, but a supply electric power set value that is an amount of current that needs to be supplied from the electric power storage device. The power supplied and current supplied are related by Joule's law, which states the power of a circuit is equal to the product of the current and voltage (i.e., P = I x V). The power supplied is proportional to the current supplied. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the control portion of Hunt et al. using a power set value instead of a current set value because it amounts to the using a known law to transform a first variable to a second variable by a known law.

Modified Hunt et al. does not explicitly disclose:

- second control means for controlling the amount of electric power consumed by the load portion

Nonobe et al. discloses a second control means (50) for controlling the amount of electric power consumed by the load portion (32 and 34, C11/L56-C12/L7) in order to prevent the remaining charge of a battery from decreasing to a critical level and protect fuel cells from excess loading (C2/L18-24). Nonobe et al. further discloses that the restriction of the motor is dependent on the charging/discharging state of the battery (S140, Fig. 6, C12/L15-C13/L16) and that the remaining charge of a storage battery should not decrease below a critical level in order to ensure a sufficient supply of electric power (C2/L17-24). Hunt et al. discloses that the HVEC error can determine the charging/discharging state of the battery (32, [0048]). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was to make the hybrid fuel cell system of Hunt et al. and include a control portion as taught by Nonobe et al. in

order to prevent the remaining charge of a battery from decreasing to a critical level to protect the battery and ensure a sufficient supply of electric power is available from the battery.

5. Claims 19-22, 27-30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hunt et al. (U.S. 2004/0083039 A1) in view of Nonobe et al. (U.S. 5,929,594 A) and Okhubo et al. (EP 1,220,413 A1).

Regarding claim 19, Hunt et al. discloses a hybrid fuel cell system (Figs. 1 and 2) comprising:

- a fuel cell (12, Fig. 1; 41, Fig. 2);
- an electric power storage device (32, Figs. 1 and 2);
- a load portion (see primary loads, [0022]; 44, Fig. 2) which consumes electric power (see supplies current, [0022]); and
- a control portion (37) that is programmed to:
    - compute a supply electric power set value (I REQ, Fig. 2) indicating an amount of electric power that needs to be supplied from the electric power storage device (32, [0039]);
    - measure an actual supply electric power value (I HVEC, Fig. 2) indicating an amount of electric power that is actually supplied from the electric power storage device (32, [0047]);
    - determine whether the supply electric power set value (I REQ, Fig. 2) is greater than or less than the actual supply electric power value (I HVEC, [0047]); and

  - change an amount of electric power (see voltage command, [0047]) after the control portion (37) determines that the supply electric power set value (I REQ, Fig. 2) is greater than or less than the actual supply electric power value (I HVEC, Fig. 2);

- wherein the control portion (37) is programmed to remove imbalance between charge and discharge (see equilibrium, [0047]) of the electric power storage device (32) in the system (Figs. 1 and 2) by reducing a difference between the supply electric power set value (I REQ, Fig. 2) and the actual supply electric power value (I HVEC, Fig. 2).

Hunt et al. does not explicitly disclose:

- a supply electric power set value, which is an amount of electric power that needs to be supplied from the electric power storage device

Hunt et al. does not explicitly discloses that the supply electric power set value is an amount of electric power that needs to be supplied from the electric power storage device, but a supply electric power set value that is an amount of current that needs to be supplied from the electric power storage device. The power supplied and current supplied are related by Joule's law, which states the power of a circuit is equal to the product of the current and voltage (i.e., P = I x V). The power supplied is proportional to the current supplied. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the control portion of Hunt et al. using a power set value instead of a current set value because it amounts to the using a known law to transform a first variable to a second variable by a known law.

Modified Hunt et al. does not explicitly disclose:

- a control portion that is programmed to change an amount of electric power consumed by the load portion to increase or decrease consumption
- wherein the control portion is programmed to change the amount of electric power consumed by the load portion to increase or decrease consumption

Nonobe et al. discloses a hybrid fuel cell system (10) comprising a control portion (50) that is programmed to change an amount of electric power consumed by the load portion (32 and 34, C11/L56-C12/L7) to increase or decrease consumption (C14/L50-67) and wherein the control portion (50) is programmed to change the amount of electric power consumed by the load portion (32 and 34, C11/L56-C12/L7) to increase or decrease consumption (C14/L50-67) in order to prevent the remaining charge of a battery from decreasing to a critical level and protect fuel cells from excess loading (C2/L18-24). Nonobe et al. further discloses that the restriction of the motor is dependent on the charging/discharging state of the battery (S140, Fig. 6, C12/L15-C13/L16) and that the remaining charge of a storage battery should not decrease below a critical level in order to ensure a sufficient supply of electric power (C2/L17-24). Hunt et al. discloses that the HVEC error can determine the charging/discharging state of the battery (32, [0048]). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was to make the hybrid fuel cell system of Hunt et al. and include a control portion as taught by Nonobe et al. in order to prevent the remaining charge of a battery from decreasing to a critical level to protect the battery and ensure a sufficient supply of electric power is available from the battery.

Further modified Hunt et al. does not explicitly disclose:

- a filter that removes a noise component contained in a difference between the

supply electric power set value and the actual supply electric power value and that outputs the difference with the noise component removed to the control portion,

Okhubo et al. discloses a filter (80a) that removes a noise component (see integrating, [0014]) to measure the charging/discharging current accurately and further the battery capacity highly precisely [0014]. Hunt et al. and Okhubo et al. are analogous art because they are directed to controlling the charging and discharging of rechargeable batteries. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make hybrid fuel cell system of modified Hunt et al. with the filter of Okhubo et al. to accurately measure the charging/discharging current and the battery capacity.

Regarding claim 20, modified Hunt et al. discloses all claim limitations set forth above and further discloses a hybrid fuel cell system:

- wherein the control portion (37) is programmed to obtain the supply electric power set value (I REQ, Fig. 2) based on
    - at least a second supply electric power set value (I FC REQ, Fig. 2) indicating an amount of electric power that needs to be supplied from the fuel cell (41, [0029]) and
    - a consumption electric power set value (I LOAD, [0056]) indicating an amount of electric power that needs to be consumed by the load portion (44, [0056]).

Regarding claim 21, modified Hunt et al. discloses all claim limitations set forth above and further discloses a hybrid fuel cell system:

- wherein the load portion (44) includes a system accessory (14, 19, 23, 24, 26, 28,

30 and 36, Fig. 1), and

- the control portion (37) is programmed to obtain the supply electric power set value (I REQ, Fig. 2),
    - using the consumption electric power set value (I LOAD, [0056]) including an amount of electric power consumed by the system accessory (44, [0056]).

Regarding claim 22, modified Hunt et al. discloses all claim limitations set forth above and further discloses a hybrid fuel cell system:

- wherein the load portion (44, Fig. 2) includes a drive motor (14, Fig. 1), and
- the control portion (37) is programmed to control an amount of electric power (see voltage command, [0047]) based on the difference between the supply electric power set value (I REQ, Fig. 2) and the actual supply electric power value (I HVEC, Fig. 2).

Hunt et al. does not explicitly disclose:

- wherein the control portion is programmed to control an amount of electric power consumed by the drive motor;

Nonobe et al. discloses wherein a control portion (50) is programmed to control an amount of electric power consumed by the drive motor (32, C11/56-C12/L7) in order to prevent the remaining charge of a battery from decreasing to a critical level and protect fuel cells from excess loading (C2/L18-24). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was to make the hybrid fuel cell system of modified Hunt et al. with the control portion of Nonobe et al. in order to prevent the remaining charge of a battery

from decreasing to a critical level and protect fuel cells from excess loading.

Regarding claim 27, Hunt et al. discloses a hybrid fuel cell system (Figs. 1 and 2) comprising:

- a fuel cell (12, Fig. 1; 41, Fig. 2);
- an electric power storage device (32, Figs. 1 and 2);
- a load portion (see primary loads, [0022]; 44, Fig. 2) which consumes electric power (see supplies current, [0022]),
- the load portion (44, Fig. 2) including a system accessory device (19, 23, 24, 26, 28, 30 and 36, Fig. 1) other than a main drive motor (14, Fig. 1); and
- a control portion (37) that is programmed to:
    - compute a supply electric power set value (I REQ, Fig. 2) indicating an amount of electric power that needs to be supplied from the electric power storage device (32, [0039]);
    - measure an actual supply electric power value (I HVEC, Fig. 2) indicating an amount of electric power that is actually supplied from the electric power storage device (32, [0047]);
    - determine whether the supply electric power set value (I REQ, Fig. 2) is greater than or less than the actual supply electric power value (I HVEC, [0047]); and
    - change an amount of electric power (see voltage command, [0047]) after the control portion (37) determines that the supply electric power set value (I REQ, Fig. 2) is greater than or less than the actual supply electric power

value (I HVEC, Fig. 2);

- a computing portion (46) that is programmed to change an amount of electric power consumed by the system accessory device (36) of the load portion (44, Fig. 1) after the difference obtaining means (70) determines that the supply electric power set value (I REQ, Fig. 2) is greater than or less than the actual supply electric power value (I HVEC, Fig. 2) to remove imbalance between charge and discharge (see equilibrium, [0047]) of the electric power storage device (32) in the system (Figs. 1 and 2) by reducing the difference (HVEC ERROR, Fig. 2) between the supply electric power set value (I REQ, Fig. 2) and the actual supply electric power value (I HVEC, Fig. 2).

Hunt et al. does not explicitly disclose:

- a supply electric power set value, which is an amount of electric power that needs to be supplied from the electric power storage device

Hunt et al. does not explicitly discloses that the supply electric power set value is an amount of electric power that needs to be supplied from the electric power storage device, but a supply electric power set value that is an amount of current that needs to be supplied from the electric power storage device. The power supplied and current supplied are related by Joule's law, which states the power of a circuit is equal to the product of the current and voltage (i.e., P = I x V). The power supplied is proportional to the current supplied. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the control portion of Hunt et al. using a power set value instead of a current set value because it amounts to the using a known law to transform a first variable to a second variable by a known law.

Modified Hunt et al. does not explicitly disclose:

- a control portion that is programmed to change an amount of electric power consumed by the load portion to increase or decrease consumption

Nonobe et al. discloses a hybrid fuel cell system (10) comprising a control portion (50) that is programmed to change an amount of electric power consumed by the load portion (32 and 34, C11/L56-C12/L7) to increase or decrease consumption (C14/L50-67) in order to prevent the remaining charge of a battery from decreasing to a critical level and protect fuel cells from excess loading (C2/L18-24). Nonobe et al. further discloses that the restriction of the motor is dependent on the charging/discharging state of the battery (S140, Fig. 6, C12/L15-C13/L16) and that the remaining charge of a storage battery should not decrease below a critical level in order to ensure a sufficient supply of electric power (C2/L17-24). Hunt et al. discloses that the HVEC error can determine the charging/discharging state of the battery (32, [0048]). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was to make the hybrid fuel cell system of Hunt et al. and include a control portion as taught by Nonobe et al. in order to prevent the remaining charge of a battery from decreasing to a critical level to protect the battery and ensure a sufficient supply of electric power is available from the battery.

Further modified Hunt et al. does not explicitly disclose:

- a filter that removes a noise component contained in a difference between the supply electric power set value and the actual supply electric power value, and that outputs the difference with the noise component removed to the control portion;

Okhubo et al. discloses a filter (80a) which removes a noise component (see integrating,

[0014]) to measure the charging/discharging current accurately and further the battery capacity highly precisely [0014]. Hunt et al. and Okhubo et al. are analogous art because they are directed to controlling the charging and discharging of rechargeable batteries. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make hybrid fuel cell system of modified Hunt et al. with the filter of Okhubo et al. to accurately measure the charging/discharging current and the battery capacity.

Regarding claim 28, modified Hunt et al. discloses all claim limitations set forth above and further discloses a hybrid fuel cell system:

- wherein the control portion (37) is programmed to obtain the supply electric power set value (I REQ, Fig. 2) based on
    - at least a second supply electric power set value (I FC REQ, Fig. 2) indicating an amount of electric power that needs to be supplied from the fuel cell (41, [0029]) and
    - a consumption electric power set value (I LOAD, [0056]) indicating an amount of electric power that needs to be consumed by the load portion (44, [0056]).

Regarding claim 29, modified Hunt et al. discloses all claim limitations set forth above and further discloses a hybrid fuel cell system:

- wherein the load portion (44) includes a system accessory (14, 19, 23, 24, 26, 28, 30 and 36, Fig. 1), and
- the control portion (37) is programmed to obtain the supply electric power set value (I REQ, Fig. 2),

  - using the consumption electric power set value (I LOAD, [0056]) including an amount of electric power consumed by the system accessory (44, [0056]).

Regarding claim 30, modified Hunt et al. discloses all claim limitations set forth above and further discloses a hybrid fuel cell system:

- wherein the load portion (44, Fig. 2) includes a drive motor (14, Fig. 1), and
- the control portion (37) is programmed to control an amount of electric power (see voltage command, [0047]) based on the difference between the supply electric power set value (I REQ, Fig. 2) and the actual supply electric power value (I HVEC, Fig. 2).

Hunt et al. does not explicitly disclose:

- wherein the control portion is programmed to control an amount of electric power consumed by the drive motor;

Nonobe et al. discloses wherein a control portion (50) is programmed to control an amount of electric power consumed by the drive motor (32, C11/56-C12/L7) in order to prevent the remaining charge of a battery from decreasing to a critical level and protect fuel cells from excess loading (C2/L18-24). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was to make the hybrid fuel cell system of modified Hunt et al. with the control portion of Nonobe et al. in order to prevent the remaining charge of a battery from decreasing to a critical level and protect fuel cells from excess loading.

Regarding claim 32, Hunt et al. discloses a hybrid fuel cell system (Figs. 1 and 2) comprising:

- a fuel cell (12, Fig. 1; 41, Fig. 2);
- an electric power storage device (32, Figs. 1 and 2);
- a load portion (see primary loads, [0022]; 44, Fig. 2) which consumes electric power (see supplies current, [0022]),
- the load portion (44, Fig. 2) including a system accessory device (19, 23, 24, 26, 28, 30 and 36, Fig. 1) other than a main drive motor (14, Fig. 1); and
- a control portion (37) that is programmed to:
  - compute a supply electric power set value (I REQ, Fig. 2) indicating an amount of electric power that needs to be supplied from the electric power storage device (32, [0039]);
  - measure an actual supply electric power value (I HVEC, Fig. 2) indicating an amount of electric power that is actually supplied from the electric power storage device (32, [0047]);
  - determine whether the supply electric power set value (I REQ, Fig. 2) is greater than or less than the actual supply electric power value (I HVEC, [0047]); and
  - change an amount of electric power (see voltage command, [0047]) after the control portion (37) determines that the supply electric power set value (I REQ, Fig. 2) is greater than or less than the actual supply electric power value (I HVEC, Fig. 2);
- computing means (46) for changing an amount of electric power consumed by the system accessory device (36) of the load portion (44, Fig. 1) to remove imbalance

between charge and discharge (see equilibrium, [0047]) of the electric power storage device (32) in the system (Figs. 1 and 2) by reducing the difference (HVEC ERROR, Fig. 2) between the supply electric power set value (I REQ, Fig. 2) and the actual supply electric power value (I HVEC, Fig. 2).

Hunt et al. does not explicitly disclose:

- a supply electric power set value, which is an amount of electric power that needs to be supplied from the electric power storage device

Hunt et al. does not explicitly discloses that the supply electric power set value is an amount of electric power that needs to be supplied from the electric power storage device, but a supply electric power set value that is an amount of current that needs to be supplied from the electric power storage device. The power supplied and current supplied are related by Joule's law, which states the power of a circuit is equal to the product of the current and voltage (i.e., P = I x V). The power supplied is proportional to the current supplied. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the control portion of Hunt et al. using a power set value instead of a current set value because it amounts to the using a known law to transform a first variable to a second variable by a known law.

Modified Hunt et al. does not explicitly disclose:

- a control portion that is programmed to change an amount of electric power consumed by the load portion to increase or decrease consumption

Nonobe et al. discloses a hybrid fuel cell system (10) comprising a control portion (50) that is programmed to change an amount of electric power consumed by the load portion (32 and 34, C11/L56-C12/L7) to increase or decrease consumption (C14/L50-67) in order to prevent the

remaining charge of a battery from decreasing to a critical level and protect fuel cells from excess loading (C2/L18-24). Nonobe et al. further discloses that the restriction of the motor is dependent on the charging/discharging state of the battery (S140, Fig. 6, C12/L15-C13/L16) and that the remaining charge of a storage battery should not decrease below a critical level in order to ensure a sufficient supply of electric power (C2/L17-24). Hunt et al. discloses that the HVEC error can determine the charging/discharging state of the battery (32, [0048]). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was to make the hybrid fuel cell system of Hunt et al. and include a control portion as taught by Nonobe et al. in order to prevent the remaining charge of a battery from decreasing to a critical level to protect the battery and ensure a sufficient supply of electric power is available from the battery.

Further modified Hunt et al. does not explicitly disclose:

- a filter which removes a noise component contained in the difference between the supply electric power set value indicating the amount of electric power which needs to be supplied from the electric power storage device and the actual supply electric power value indicating an amount of electric power which is actually supplied from the electric power storage device, and which outputs the difference with the noise component removed to the control portion; and

Okhubo et al. discloses a filter (80a) which removes a noise component (see integrating, [0014]) to measure the charging/discharging current accurately and further the battery capacity highly precisely [0014]. Hunt et al. and Okhubo et al. are analogous art because they are directed to controlling the charging and discharging of rechargeable batteries. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make

hybrid fuel cell system of modified Hunt et al. with the filter of Okhubo et al. to accurately measure the charging/discharging current and the battery capacity.

Response to Arguments

6. Applicant's arguments filed March 8, 2011 have been fully considered but they are not persuasive.

Regarding applicants' argument that that Hunt is not concerned about the power supplied from the battery (P10/¶6), the HVEC controller (38)is used to control the power supplied from the battery (32, [0027]). Therefore, Hunt is concerned about the power supplied from the battery.

Regarding applicants' argument that the measured current (I HVEC) and the requested current (I REQ) is an amount of electric power that needs to be supplied or indicates an amount of electric power that is actually supplied from an electric power storage device (P11/¶1), Hunt et al. discloses that I HVEC is a measured current supplied from the battery (32, Fig. 2). The current supplied is proportional to the power supplied as known from Joule's Law. The measured current is a value that indicates an amount of electric power that is actually supplied from an electric power storage device. Hunt et al. further discloses that I REQ is a current requested from the battery (32, [0039]). The current requested is proportional to the power requested as known from Joule's Law. The requested current is a value that indicates an amount of electric power that needs to be supplied. The power supplied and current supplied are related by Joule's law, which states the power of a circuit is equal to the product of the current and voltage (i.e., $P = I \times V$). The power supplied is proportional to the current supplied. It would have been obvious to one of ordinary skill in the art at the time of the invention to make the control portion of Hunt et

al. using a power set value instead of a current set value because it amounts to the using a known law to transform a first variable to a second variable by a known law. Therefore, the measured current (I HVEC) and the requested current (I REQ) indicate an amount of electric power that needs to be supplied or indicates an amount of electric power that is actually supplied from an electric power storage device; and it would have been obvious to transform the current measured to a measured power.

Regarding applicants' argument that Hunt discloses the difference is used to generate a voltage command for the HVEC (P11/¶4), one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Regarding applicants' argument that Nonobe discloses that the amount of electric power consumed ... is restricted based on the remaining charge of the storage battery (P12/¶1), Nonobe et al. further discloses that the amount of electric consumed by the load portion is restricted by the charging/discharging state of the battery (S140, Fig. 6, C12/L15-C13/L16), which can be determined by the HVEC error determined by Hunt et al. Therefore, Nonobe discloses that the amount of electric power consumed is restricted based on the remaining charge of the storage battery and the discharging/charging state of the storage battery.

Regarding applicants' argument that the combination of Hunt and Nonobe is significantly than the control portion of claim 15, the combination of Hunt and Nonobe is not significantly different than the control portion of claim 15 as detailed above. One of ordinary skill in the art would combine the control strategy of Nonobe with the controller of Hunt in order to prevent the

remaining charge of a battery from decreasing to a critical level and protect fuel cells from excess loading. A skilled artisan would used the HVEC error of Hunt et al. to determine the charging/discharging state of the storage battery used in the control strategy of Nonobe; and use the load restriction as taught by Nonobe to prevent the battery from falling below a critical level. Therefore, the combination of Hunt and Nonobe is not significantly different than the control portion of claim 15.

Regarding applicants' argument that independent claims 19, 23, 27, 31 and 32 are patentable because the references fail to disclose or suggest the similar features of claim 15 (P12/¶3), claim 15 is not patentable as detailed above.

Regarding applicants' argument that the claims dependent from claims 15, 19, 23, 27, 31 and 32 are patentable because the independent claims are patentable (P13/¶3), independent claims 15, 19, 23, 27, 31 and 32 are not patentable as detailed above.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sean P. Cullen, Ph.D. whose telephone number is 571-270-1251. The examiner can normally be reached on Monday thru Thursday 6:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley can be reached on 571-272-1453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. P. C./
Examiner, Art Unit 1725

/Basia Ridley/
Supervisory Patent Examiner, Art Unit 1725